

EFFECTS OF AIR POLLUTION AND TEMPERATURE ON VASCULAR FUNCTION IN PEOPLE WITH DIABETES

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Background and Aims: Diabetes is associated with impaired vascular function, and people with diabetes may be vulnerable to air pollution and temperature effects on cardiovascular morbidity and mortality. In people with diabetes, we investigated how changes in pollution and temperature influenced changes in brachial artery diameter that may reflect biologic mechanisms through which pollution influences the risk of clinical cardiovascular events.

Methods: The complete study population consisted of 49- to 85-year old Boston residents (N=64) with type 2 diabetes, observed up to 5 repeated times. Baseline brachial artery diameter (BAD), and flow- and nitroglycerin-mediated dilation were measured by ultrasound at each visit. Air pollutant exposures for black carbon (BC), organic carbon (OC), nitrogen dioxide (NO₂), PM_{2.5}, particle number (PN), sulfates (SO₄) and particulate mass components (nickel and zinc) were measured at our stationary ambient monitoring site. We applied linear models with fixed effect for subjects, adjusting for temperature, date and season. Effect estimates were scaled by the interquartile pollutant range (IQR).

Results: Smaller diameter was associated with increases in the means of the one- to four- day levels of pollution. For example, decreases in BAD occurred with increases in the mean 4-day levels of BC (-0.04 mm, 95% C.I.: -0.07 - -0.002 for an IQR=0.3 µg/m³), OC (-0.07 mm, 95% C.I.: -0.11- -0.03), PM_{2.5}, NO₂, and CO. In contrast, diameter was larger by 0.13 mm (95% C.I.: 0.075 - 0.19) for an increase of 10 degrees C in the previous 24h mean temperature. FMD responses were less consistent, with a suggestion of positive associations mostly in subjects with smaller BAD (female).

Conclusion: The pollution- and temperature- associated changes in brachial artery diameter that we observed may reflect biologic mechanisms through which pollution increases cardiovascular risk in people with diabetes.

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